

Remarks

Claims 1 - 19 are pending. Favorable reconsideration is respectfully requested.

Applicants believe that a thorough discussion of the invention, and the problem addressed and solved, may facilitate a better understanding of the invention and thus expedite prosecution.

The present invention is directed to adhesives, useful in particular for adhering tiles to cementitious substrates.

Adhesives for tile applications must possess a requisite degree of tack, cohesiveness, and tensile strength, among other properties. To meet these requirements, it has been customary in the past to employ copolymers of ethylene, vinyl acetate, and alkyl acrylates such as butylacrylate and 2-ethylhexyl acrylate. Unfortunately, in the basic environment experienced by the tile adhesive, these "weak" acrylate esters hydrolyze to generate the free, volatile alcohol, i.e. butanol or 2-ethylhexanol. These are now classified as Volatile Organic Contaminants ("VOC"s), and are environmentally and toxicologically undesirable. Such conventional tile adhesives can generate these alcohols for extended periods.

Thus, the problem addressed by Applicants was to provide tile adhesives which are free from generation of alcohols by hydrolysis, and which yet satisfy the requisite adhesive physical properties, i.e. tack, adhesive strength, etc. For example, ethylene/vinyl acetate copolymers do not generate alcohol emissions. However, their physical properties are deficient, and they cannot be used as tile adhesives. *See, e.g.*, Comparative Examples C11 and C12, whose properties are summarized on page 17 of the specification. These copolymers exhibit low tack, low cohesion, and low peel strength.

Applicants have surprisingly found that adhesives with acceptable and even superior physical properties, as compared to adhesives employing alkyl acrylates, may be

prepared without alkyl acrylates and thus without the possibility of generating alcohol emissions, if the copolymers have a Tg of about -60°C to -10°C , and are prepared from

- a) ethylene,
- b) a vinyl ester of optionally branched C_{1-9} carboxylic acid whose homopolymers have a $\text{Tg} > 0$;
- c) a vinyl ester of C_{8-13} branched carboxylic acids whose homopolymers have a $\text{Tg} < 0^{\circ}\text{C}$, preferably VeoVa® 10 and /or VeoVa® 11;
- d) from 0.5 to 10% by weight of a C_{3-4} mono- or dicarboxylic acid, preferably 2% to 6% by weight;
- e) optionally up to 10% by weight of an ethylenically unsaturated, hydroxyalkyl monomer;
- f) and up to 10% by weight of further ethylenically unsaturated monomers, wherein the copolymers are free of alkyl acrylates.

As shown in the Table on page 17 of the specification, these copolymers have physical properties which meet or exceed copolymers based on alkyl acrylates, while being free of hydrolysis-generated alcohol emissions. Such adhesives are neither taught nor suggested by the prior art.

Prior to discussing the references and rejections, Applicants believe it would be helpful to focus for a moment on the two distinct classes of vinyl ester monomers (Applicants' (b) and (c) monomers). The glass transition temperature of homopolymers (note: homopolymers, not copolymers) of unsaturated monomers is important to the technology of copolymer dispersions and the copolymer powders prepared therefrom. For example, on page 5 of the specification, the well known "Fox equation" is discussed. This equation may be used to calculate the expected Tg of a copolymer, based on the mass fractions of the copolymer derived from each individual monomer and that monomers homopolymer Tg. Tables of homopolymer Tgs are readily available, as indicated, and in the case of newly available monomers, may be measured by preparing a homopolymer of the monomer and measuring its Tg by simple, known techniques, for example DSC.

The vinyl ester monomers (b) must have a homopolymer Tg above 0°C, while the branched vinyl ester monomers (c) must have a homopolymer Tg below 0°C. Otherwise, the benefits of the invention will not be obtained. The preferred (b) monomer is vinyl acetate, while the preferred (c) monomers are VeoVa®10 and VeoVa®11, vinyl esters of α -branched carboxylic acids having 10 and 11 carbon atoms respectfully.

The vinyl esters of versatic acid (vinyl versatates), are a known class of vinyl esters of α -branched carboxylic acids having from 5 to perhaps 40 or more carbon atoms. However, their homopolymer Tgs do not vary in a systematic manner. Relevant to the subject invention are the Tgs of VeoVa®9 (+60°C), VeoVa®10 (-3°C), and VeoVa®11 (-40°C). The latter two, VeoVa®10 and VeoVa®11 are preferred (c) monomers (homopolymer Tg < 0), while VeoVa®9, with its much higher homopolymer Tg, is a (b) monomer, not a (c) monomer.

In the Office Action, the comment was made with respect to one of the claims where Tg was limitation (now a limitation of all the claims, as discussed below), that the copolymers of the prior art must inherently ("intrinsically") meet the Tg requirements, since the amounts of monomers used in the prior art products are within the ranges required by Applicants' claims. This is incorrect, however. The claims have both compositional limitations with respect to each monomer class as well as a Tg limitation for the copolymer itself. Merely because a copolymer meets the compositional limitations does not imply that it also meets the Tg limitation. These are different and distinct limitations.

The copolymers of Comparative Examples C11 and C12 are both ethylene/vinyl acetate copolymers. The C12 copolymer has a higher amount of ethylene and thus a much lower Tg. When greater than three classes of monomers are used, it is possible to vary the Tg over wide ranges, including ranges outside the scope of the claims, while still being within the compositional limits. Conversely, it is also possible to prepare polymers inside of the claimed Tg range of -60°C to -10°C while being outside the compositional ranges. For any proposed hypothetical polymer, the Tg may be calculated in advance by using the Fox equation. Thus, Tg and monomer composition are only "directly" related when employing but two monomers.

When, as here, minimally four and in some cases (presence of (e) and (f) monomers), five or six monomer classes are involved, there is no such relationship. Instead, the Tg can be measured, or can be calculated by the Fox equation. The compositional ranges and Tg constitute two separate limitations, not one.

Claims 7 - 10 have been rejected for use of the trademarks VeoVa®10 and VeoVa®11, for which Applicants' attorney apologizes. The generic descriptions from page 4, ¶1 have replaced these in amended claim 7. Also, product definition sheets for VeoVa®9 (a (b) monomer) and VeoVa®10 and VeoVa®11 have been enclosed, as suggested by the Examiner. In addition, claims 1, 12, and 13 have been amended to more particularly point out and distinctly claim what Applicants have regarded as their invention. In particular, the Tg range of the copolymer adhesive, -60°C to about -10°C has been added. This is the preferred temperature range recited on page 5, line 25 of the specification, and incorporates within this range all of the Examples. No new matter is added by virtue of this amendment. Withdrawal of the rejection under 35 U.S.C. § 112 ¶2 is solicited.

Claims 1 - 8 and 11 - 16 have been rejected under 35 U.S.C. § 103(a) as unpatentable over Japanese Patent 47-3705 in view of EP 295 727. Applicants respectfully traverse.

First, it is respectfully submitted that the rejection over a foreign language reference, without supplying a full translation of the underlying document is improper. The disclosures of the two Japanese references (one in this rejection and an additional Japanese reference in the second rejection) can only be guessed at, at best. Moreover, the JP references may have additional disclosure which would further foreclose their combination with the EP '727 reference, or which would lead one skilled in the art away from the claimed invention. The Board has already sternly addressed this issue in at least three non-precedential opinions, *Ex. parte Jones*, 62 U.S.P.Q. 2d 1206 (BPAI 2001), *Ex. parte Gavin*, 62 U.S.P.Q. 2d 1680 (BPAI 2001), and *Ex. parte Bonfils*, 64 U.S.P.Q. 2d 1456 (BPAI 2002). If the rejection is

maintained, Applicants respectfully request full translations and a new non-final period for response, in order that the totality of the references' teachings may be addressed.

Second, Applicants contend that *prima facie* obviousness has not been established, as there is no evidence to support combining the references, and in fact they are non-combinable.

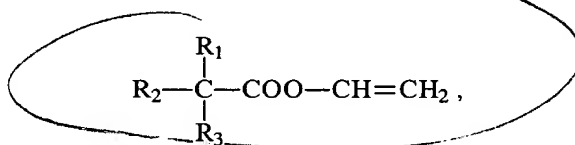
The Federal Circuit has addressed combinability of references several times within the last two years. In the case of *In re Anita Dembiczak* and *Benson Zinbarg*, 50 U.S.P.Q.2d 1614 (Fed. Cir. 1999), the CAFC has indicated that the requirement for showing the teaching or motivation to combine references is "rigorous." *Dembiczak* at 1617. Moreover, this showing, which is rigorously required, must be "clear and particular." *Dembiczak* at 1617. See also, *C.R. Bard v. M3 Sys., Inc.*, 48 U.S.P.Q.2d 1225, 1232 (Fed. Cir. 1998). It is well established that merely because references can be combined, the mere suitability for logical combination does not provide motivation for the combination. See, *Berghauser v. Dann, Comr. Pats.*, 204 U.S.P.Q. 398 (DCDC 1979); *ACS Hospital Systems, Inc. v. Montefiore Hospital*, 221 U.S.P.Q. 929 (Fed. Cir. 1984). Moreover, mere conclusory statements supporting the proposed combination, standing alone are not "evidence". *McElmurry v. Arkansas Power & Light Co.*, 27 U.S.P.Q.2d 1129, 1131 (Fed. Cir. 1993). See also, *In re Lee*, 61 U.S.P.Q. 2d 1430 (Fed. Cir. 2002).

Applicants find a total lack of any evidence of record which supports the combination.

JP 72 003705 ("JP '705") appears to teach (based on the abstract), a coating composition containing a copolymer of 10 - 60% ethylene (Applicants' component (a)) 10 - 85% vinyl acetate (Applicants' component (b)), and 5 - 30% of a vinyl ester of a tertiary carboxylic acid. The identity of the latter is unspecified, however, so it is not known whether this component corresponds to Applicants' component (b) or (c). The patent does not seem

to be directed to adhesives, but to coatings exhibiting weather resistance and good adhesion to the substrate, i.e. a "paint". No copolymer Tg is given.

On page 1, column 2 of the patent, a formula for the vinyl ester is given:



With text (in Japanese) which may (or may not) indicate that R_1 , R_2 , and R_3 have from 3 to 11 carbon atoms, thus describing carboxylic acids having from 9 - 33 carbon atoms. No homopolymer Tg of any of these esters is known to be present, no direction known to be present to select any particular ester, and no indication known to be present that any of the esters are different from the others. There is no apparent use of acrylic acid or other mono- or dicarboxylic acid (Applicants' component (d)). Any interpretation of the JP reference is speculative at best, and insufficient to support any rejection.

EP 0 295 727 ("EP '727") is directed to latex paints which are non-tacky when dry. Non-tackiness is said to be important to prevent future soiling (adherence of dust, etc.) of the painted surface. EP '727 achieves this non-tacky paint by specifying that the Tg of the latex copolymer be in the range of $+20^\circ\text{C}$ to 120°C (page 2, line 45) and that the vinyl ester employed (in addition to vinyl acetate) be VeoVa®9 (an Applicant component (b) ester). EP '727 expressly teaches against employing VeoVa®10 (page 2, lines 38 - 45). The EP '727 patent discloses use of a small amount (0.5%) of copolymerized acrylic acid to stabilize the polymer against coagulation and/or sedimentation (not the purpose for which Applicants employ their component (d)).

Thus, even assuming, in the lack of a translation, that JP '705 discloses VeoVa®10¹, EP '727 directly teaches against its use. These teachings are diametrically

¹ Only a supposition. There is no evidence to support such an assumption.

opposed. Not only is there no evidence to support combination; rather, the reverse is true. The diametrically opposed teachings mitigate against combination. In the absence of evidence of motivation to combine, no *prima facie* has been established, and the rejection must be withdrawn for this reason.

However, even assuming combination were proper, the combination would still not teach or suggest the present invention.

First, there is no teaching of any range of Tg of the copolymer except the Tg range of EP '727 of +20 to +120°C. Applicants' claimed Tg range is far below this range. EP '727 teaches avoiding low Tg copolymers to avoid soiling problems. Applicants' claim limitation of Tg from -60°C to about -10°C is neither taught or suggested. Rather, EP '727 teaches against low Tg resins, requiring higher Tg resins to eliminate soiling.

Second, EP '727 teaches against use of the very vinyl esters which are preferred by Applicants, and JP '705 does not suggest why this contrary teaching should be ignored. If (a big "if") JP '705 teaches vinyl esters of C₉₋₃₃ tertiary carboxylic acids, it may not teach or suggest employing as Applicants' component (c), only vinyl esters with homopolymer Tg < 0°C. For example, a C₉ tertiary carboxylic acid vinyl ester (VeoVa®9) has a Tg of +60°C, which does not meet the claim limitations. The Tgs of tertiary carboxylic acids of 12 - 33 carbon atoms are not available to Applicants' attorney. However, whether or not such vinyl esters have known homopolymer Tgs, there is no suggestion to employ for component (c), a vinyl ester having a homopolymer Tg of < 0°C.

Finally, neither reference teaches avoiding alkyl acrylates. The teachings of JP '705 are unknown. The teaching of EP '727 is that up to 10% by weight of any other monomer may be used.

For all these reasons, the rejection over *JP* '705 in view of *EP* '727 must be withdrawn.²

Claims 1 - 16 have been rejected under 35 U.S.C. § 103(a) over *JP* '705 and *EP* '727 further in view of JP 4-145182 ("*JP* '182"). The *JP* '705 and *EP* '727 references have been discussed, and the arguments relative to the lack of a *prima facie* case and the non-obviousness over the combination, were it proper, are repeated. *JP* '182 adds nothing to the rationale of the rejection, nor again, is it believed properly combinable with either *EP* '727 or *JP* '705.

JP '182 teaches flooring adhesives employing a mixture of two different copolymers, first, a vinyl acetate/ethylene copolymer, and second, one of either a vinyl acetate/"VeoVa" copolymer or a vinyl acetate/"VeoVa"/acrylic acid copolymer³. Applicants' claims do not include any of such copolymers within their scope.

JP '182's vinyl acetate/ethylene copolymers lack Applicants' components (c), and (d); its vinyl acetate/VeoVa copolymer lacks Applicants' components (a), (c) [see discussion below] and (d); and the vinyl acetate/VeoVa/acrylic acid copolymer lacks Applicants' components (a) and (c) [see below].

JP '182 does not teach or suggest the adhesives of the subject invention, whether alone or in combination with the other references. The ethylene/vinyl acetate copolymers used as part of the mixture are known to be deficient in adhesive qualities. The two other polymers are fundamentally different, neither employing any ethylene.

² It is also noted that neither references teaches adhering a covering, as required by claims 8 - 10. If Applicants are incorrect, the relevant portions of the references should be supplied. The same is true of claim 19. None of the references teach the subject matter of claims 7, 12, and 17 - 18 as well, where the acid component (d) is used in the preferred range of 2-6%.

³ The "VeoVa" is not modified by any carbon content, *i.e.* VeoVa®9, VeoVa®10, or VeoVa®11. Thus, it is not known what "VeoVa" means.

Further, *JP '182* does not teach or suggest Applicants' component (c). The "VeoVa" is not specified, and could certainly be VeoVa^{®9}, which does not meet the homopolymer Tg limitation of Applicants' claims. It could also be some other product, or may be totally unspecified, rendering the reference non-enabling.


While Applicants' claims do not forbid addition of other copolymers to form a copolymer mixture, mixtures are not required, yet adhesive properties are excellent. *JP '182* implies that "one copolymer" adhesives are never satisfactory, and that mixtures of at least two copolymers are necessary. Thus, *JP '182* also teaches against using the copolymers of either *JP '705* or *EP '727*, each of which is employed alone, not in a mixture, and neither of which are similar to those of *JP '182*. Moreover, none of the references are known to teach or suggest Applicants' claimed Tg range of -60 to -10°C.

In the absence of any evidence of motivation to combine the three references, in view of the opposed teachings of *EP '727* in view of the two Japanese references; in view of the opposed teachings of *JP '182* in view of either *JP '705* or *EP '717*; in view of the lack of any teaching to avoid alkyl acrylates; in view of the lack of any teaching to employ both a (b) vinyl ester and a (c) vinyl ester with their respective homopolymer Tg limitations; and in view of the lack of any teaching of Applicants' copolymer Tg range, Applicants submit that the rejection of claims 1 - 16 over *JP '705*, *EP '717* and *JP '182* must be withdrawn.

Applicants submit that the claims are now in condition for Allowance, and respectfully request a Notice to that effect. If the Examiner believes that further discussion will advance the prosecution of the Application, he is highly encouraged to telephone Applicants' attorney at the number given below.

Respectfully submitted,

Holger Kunstle et al.

By 

William G. Conger

Reg. No. 31,209

Attorney/Agent for Applicant

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BROOKS & KUSHMAN P.C.

1000 Town Center, 22nd Floor

Southfield, MI 48075

Phone: 248-358-4400; Fax: 248-358-3351

Enclosures